

**Amendment and Response**

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Serial No.: 09/942,200

Confirmation No.: 8194

Filed: 29 August 2001

For: DIFFUSION BARRIER LAYERS AND METHODS OF FORMING SAME**Remarks**

The Final Office Action of November 10, 2005 has been received and reviewed. With claims 23, 25, 27, 32, 37, and 49 having been amended, claims 24, 28, 29, 35, 36, 38, and 39 having been canceled without prejudice, the pending claims are claims 23, 25-27, 30-34, 37 and 41-49. While Applicant believes the previous response contained arguments sufficient to overcome these rejections, reconsideration and withdrawal of the rejections are respectfully requested for the additional reasons set forth below.

**Claim Amendments**

Claims 23, 27, 32, and 37 are amended herein to include the recitation: x is in the range of about 0.90 to about 0.98. This amendment finds support in the application as originally filed (see, e.g., *Specification*, now canceled claims 24, 29, 36, and 39).

Claims 25 and 49 have been amended to address their dependencies only in view of now-canceled claims 24 and 39.

**The 35 U.S.C. §102 Rejection**

A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.

M.P.E.P. § 2131, citing *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987).

Claims 23, 26-28, 30-35, 37-38, 42, 44-45, and 47 were rejected under 35 U.S.C. §102(b) as being anticipated by Wolters et al. (U.S. Patent No. 5,744,832). Claims 28, 35, and 38 have been canceled, rendering their respective rejections moot. Of the remaining claims, independent claims 23, 27, 32, and 37 have been amended to recite a range of x that was formerly included in now-canceled dependent claims 24, 29, 36, and 39 (which form no part of this rejection). As a result, it is submitted that Wolters et al. fails to anticipate claims 23, 27, 32, and 37. Moreover, dependent claims 26, 30-31, 33-34, 42, 44-45, and 47 are submitted to be allowable not only in

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view of their dependence, but also because of the particular subject matter recited therein.

Reconsideration and withdrawal of the rejection are requested.

**The 35 U.S.C. §103 Rejections**

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations.

M.P.E.P. § 2143.

**Claims 41 and 46**

Claims 41 and 46 were rejected under 35 U.S.C. §103(a) as being unpatentable over Wolters et al. in view of Bronner et al. (U.S. Patent No. 6,177,696). For the reasons already identified above, Wolters et al. fails to teach, or even suggest, the range of x recited in amended independent claims 23 and 37 (from which claims 41 and 46 respectively depend). Nothing is identified within the disclosure of Bronner et al. that remedies this deficiency. For at least this reason, reconsideration and withdrawal of the rejection are respectfully requested.

**Claims 43 and 48**

Claims 43 and 48 were rejected under 35 U.S.C. §103(a) as being unpatentable over Wolters et al. in view of Sandhu et al. (U.S. Patent No. 5,335,138). For the reasons already identified above, Wolters et al. fails to teach, or even suggest, the range of x recited in independent claims 23 and 37 from which claims 43 and 48 respectively depend. Nothing is identified within the disclosure of Sandhu et al. that remedies this deficiency. For at least this reason, reconsideration and withdrawal of the rejection are respectfully requested.

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For: DIFFUSION BARRIER LAYERS AND METHODS OF FORMING SAMEClaims 24, 25, 29, 36, 39, and 49

Claims 24, 25, 29, 36, 39, and 49 were rejected under 35 U.S.C. §103(a) as being unpatentable over Wolters et al. Applicant traverses this rejection for at least the reasons set forth below.

As stated above, claims 24, 29, 36, and 39 have been canceled and their subject matter incorporated into independent claims 23, 27, 32, and 37, respectively. Accordingly, remarks directed to this rejection are addressed in the context of claims 23, 27, 32, and 37. Claims 25 and 49 have been revised only to depend from amended independent claims 23 and 37, respectively.

Claim 23 (which incorporates subject matter of now-canceled claim 24 and from which claim 25 depends), claim 27 (which incorporates subject matter of now-canceled claim 29), claim 32 (which incorporates subject matter of now-canceled claim 36), and claim 37 (which incorporates subject matter of now-canceled claim 39 and from which claim 49 depends) are amended herein to recite a platinum(x):ruthenium alloy, where x is in the range of about 0.90 to about 0.98. As the Office Action admits (see page 7), Wolters et al. fails to teach such a range. However, the Office Action further asserts at page 7 that "it would have been obvious to one of ordinary skill in the art . . . to modify Wolters by having x [be] about 0.90 to about 0.98, since it has been held that where the general conditions of a claim are disclosed in the prior art[,] discovering the optimum or working ranges involves only routine skill in the art." Applicant disagrees.

Wolters et al. is directed to "a method which results in a semiconductor device having a good electrical contact between the conducting region and the lower electrode," (Col. 3, Lns. 57-60). To achieve this goal, Wolters et al. teaches a method that provides alternately depositing platinum with a metal capable of forming a conductive oxide (*see, e.g.*, Col. 6 Lns 8-12). "Preferably, ruthenium is provided as the metal capable of forming a conductive oxide. A platinum layer with more than 15% ruthenium and a ruthenium oxide layer together form a very effective barrier against oxygen," (Col. 4, Lns. 15-19, emphasis added).

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Accordingly, Wolters et al. describes a "layer 111 comprising platinum" that "contains more than 15 atom % of a metal capable of forming a conductive metal oxide," i.e., Ruthenium (see, e.g., Col 5, Lns. 31-41).

To illustrate its point, Wolters et al. demonstrates, in Figure 2, that platinum layers (111) having less than 15% atomic percentage ruthenium, e.g., 10%, result in a tungsten oxide layer being "formed at the boundary 4 between the conducting tungsten layer 5 and the layer 11 comprising platinum" (Col. 5, Lns. 41-60). Figure 3, on the other hand, illustrates only a very small quantity of oxygen present at the boundary 4 when the ruthenium percentage is above 15% (e.g., about 30%).

Accordingly, Wolters et al. indicates that the layer 111 contains "more than 15% ruthenium" to be effective (Col. 5, Lns. 31-34). This would result in, at a maximum 85% platinum in the layer 111.

For at least this reason, Wolters et al. does not teach or suggest a platinum(x): ruthenium layer, wherein x is in the range of about 0.90 to about 0.98 as claimed. In fact, if anything, Wolters et al. teaches away from the present invention by suggesting use of a layer having less than 85 atomic percentage platinum. Wolters et al. clearly shows that a layer having more than 85 atomic percentage platinum results in the formation of the undesirable tungsten oxide layer (see, e.g., description of Figure 2 of Wolters et al.). As the M.P.E.P. makes clear, "[i]f proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification." M.P.E.P. § 2143.01, citing *In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984).

Accordingly, Applicant submits that amended independent claims 23, 27, 32, and 37 are not obvious over Wolters et al. Moreover, claims dependent upon these claims (e.g., claims 25 and 49) are also submitted to be patentable over Wolters et al. not only due to their dependence, but also because of the particular subject matter recited therein. Reconsideration and withdrawal of the rejection are requested.

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**Comments on "Response to Arguments"**

Applicant maintains the previous assertions regarding Wolters et al., e.g., its failure to teach or suggest simultaneous co-deposition as recited in the claims of the instant application. However, in view of the amendments and remarks provided herein, no additional arguments with respect to Applicant's previous remarks are provided herein.

**Summary**

It is submitted that the pending claims are in condition for allowance and notification to that effect is requested. The Examiner is invited to contact Applicant's Representatives, at the below-listed telephone number, if it is believed that prosecution of this application may be assisted thereby.

Respectfully submitted by

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**CERTIFICATE UNDER 37 CFR §1.8:**

The undersigned hereby certifies that this paper is being transmitted by facsimile in accordance with 37 CFR §1.6(d) to the Patent and Trademark Office, addressed to Mail Stop RCE, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on this 9th day of February, 2006, at 2:34pm (Central Time).

By: Name: Sara E. Wigart